

# CHAPTER TWELVE

## SCIENCE AS RHETORIC IN MEDIA DISCOURSES ON CLIMATE CHANGE

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### **Abstract**

This article aims to analyse and describe the organization of reported speech in a corpus of Portuguese newspaper articles, as well as the way such texts function in terms of rhetoric and argumentation. The focus is on media discourse on the science(s) of climate change, including reports on new studies, publications, expert testimonies, etc.

In Portugal, news discourses on climate change have a strong interdiscursive relation with scientific discourse and tend to present science as an authoritative source of reliable knowledge. This reliance on scientific discourse is associated with a media strategy of persuasion of the audience, the effectiveness of which depends on the representations of validity of scientific knowledge. By evoking voices from the science community, the journalist can both project an image of neutrality and legitimise her/his discourse. This is instrumental for the success of her/his illocutionary goals, for the acceptance of her/his speech and even for the public sanction of a given discourse on the environment.

### **Introduction**

Being a space of convergence of multiple voices and multiple discourses, media discourse has its own rhetoric. The interplay between various enunciators—with different abilities, statuses and agendas—conditions the production and the reception/interpretation of texts, and contributes to shaping other orders of discourse and other spheres of social intervention. In this article, we aim to shed light on some of the interdiscursive

mechanisms that are present in Portuguese media discourse. More specifically, we will analyse the textual and discursive resources of representation of scientific knowledge in media texts on climate change and the implications of those choices for the interpretation of and action upon the issue.

Climate change is a central issue in the “publicly dominant discourse” (Jung 2001, 271): it has a global nature both in terms of its causes and effects, it is related to a variety of social spheres, and interpenetrates various other environmental issues. Climate change is the most salient and, in the long run, probably the most serious of all environmental problems. It has become a paradigmatic issue: it represents a changed planet and the risks that hang over mankind, regardless of borders or social, cultural and religious differences, insofar equalizing all humans despite the very different responsibilities they have in the production of the problem and their diverse vulnerabilities to its impacts.

Public discourses on climate change bring together a wide variety of claims and points of views. In part, at least, this is due to the multifaceted nature of the problem. To be understood, it requires the knowledge and the research of a variety of scientific disciplines, from atmospheric physics to biology. To be addressed, it needs the coordination of policy-makers, business and citizens.

From a linguistic/discursive point of view, discourses on climate change can be viewed as constitutive of many other environmental discourses, acquiring the status of a founding interdiscourse which touches upon a variety of aspects of environmentalism, such as ethical standpoints and injunctions of behavioural change. Discourses on climate change illustrate various argumentative strategies and the tense interplay of a variety of voices and opinions.

This paper builds on research done for a project entitled “The Politics of Climate Change: Discourses and Representations”<sup>1</sup>, which aims to understand the connections between the discourse of social actors on climate change, the media discourse and the lay public’s perceptions of the issue. The discursive reconstruction of the science of climate change in the Portuguese media is one of the focuses of analysis and the main theme of this article<sup>2</sup>.

The newspapers analysed here are *Público* and *Correio da Manhã*, respectively a “quality” and a “popular” daily. Checking whether there are significant differences in the discourses on science in news outlets with different market profiles is one of our goals. We look at newspaper texts from a few weeks surrounding three significant events: the Kyoto Conference of the Parties to the United Nations Framework Convention on

Climate Change in December 1997 (and the preparation thereof), George W. Bush's announcement in March 2001 that he would not ratify the Kyoto Protocol, and the debate that took place in February 2006 on the possible construction of a nuclear power station in Portugal and its impact on greenhouse gas emissions. These are critical moments in the social construction of climate change. They are associated with key political decisions underpinned by scientific knowledge. Both the Kyoto Conference and Bush's decision led to peaks in the volume of media coverage, as well as, in the case of *Público*, to the publication of special theme dossiers. The opposition in the direction of policy-making between these two events is an added interest factor. The third event was chosen mainly due to its relevance for Portugal, linking a global issue to the national level, and because of the use of science-based arguments related to climate change in the promotion of nuclear energy.

We present some discursive segments to examine the structures and modes of functioning of these interdiscursive texts and the morpho-lexical, syntactic, semantic and textual/discursive resources therein, which serve given pragmatic-communicational goals.

### **Environmental and scientific discourses: interdiscursivity and rhetoric**

Reviving Susan Miller's (1991) metaphor, Myerson and Rydin (1996) associate what they label as "environet"—an aggregate of environmental texts—to a "textual carnival". Thereby they highlight the dynamic nature of environmental discourses, the perpetual motion of creation and breaking of contacts and the mixing of a multitude of voices in a heterogeneous polyphony where prestigious voices meet peripheral ones, authorized individuals meet the common citizen, allegedly permanent voices join assumedly transitional ones.

Such an "environet" corresponds to what Moirand (2000, 2003) designates as the "polyphonic interdiscourse", which is one of the constitutive elements of the explanatory function of the media discourse. This translates into "interdiscursive threads", which are detectable in themes and textual structures, and which activate the readers' "interdiscursive memory", conversing with past discourses and being projected into future ones. Hence, Moirand refers to a "multi-voiced media discourse" (2003, 181), an idea which evokes Bakhtine's (1981) notion of dialogism. In the same line, we may recall Fairclough's (1995) emphasis on the intertextuality of media discourse, which also points to the interrelations between texts and speakers, and Bernstein's (1996) concept

of recontextualization highlighting the successive relocations and reappropriations of discourses.

The voice of science is one of the most frequent and powerful in media discourses on environmental issues. Scientific discourse provides the media with data, vocabulary and models of textual organization. As thoroughly discussed by Gross (1990) and other scholars, science has a specific and compelling rhetoric. One of the questions that this article addresses is whether and how this rhetoric permeates media discourse on climate change and what its functions in this interdiscursive product may be.

Access to scientific discourse requires discipline-specific skills, acquired by training and learning. It is therefore beyond the reach of the common citizen, whose views of science and scientists are marked by a typical set of ideas and expectations. Such public image of science is grounded on the belief that it has a neutral and informative role, and that it provides stable and eternally valid truths. Moreover, citizens often think that the scientific community is fully prepared to deal with all social and natural realities, and that scientists and scientific research are alien to social and political pressures (cf. Calsamiglia 2003). In fact, as social studies of sciences have amply shown (e.g. Latour and Woolgar 1986), scientific activity is shaped and constrained by a number of social factors; it depends upon particular value-informed choices; it is permeable to interests and experiences; and scientific knowledge has a dynamic, temporary nature.

Constructivist scholars such as Mondada (1995) have analysed the process of construction of scientific knowledge and the key role of the texts that embody such knowledge. From the messy contingencies of science-in-the-making to the seeming facticity of scientific “discoveries” go various forms of discursive intervention where knowledge is stabilized and awarded credibility. The rhetorical aspects involved in the authorization of the scientific text and in the objectivation and naturalisation of the objects of science will therefore continue to deserve the attention of discourse analysis and of social studies of science.

As a linguistic/discursive process and product with unique conditions of production and interpretation, scientific discourse has a specific form which is visible at all linguistic levels: from the micro-textual (preferred terminology and syntax, tendency for monosemy<sup>3</sup>) to the macro-textual level (genders and structures, stylistic restrictions, maximum economy and pertinence, objectivity).

In verbal interaction, the discourse of science is one of the most powerful rhetorical resources available to speakers. Its use presupposes an

implicit contrast with the irrationality of *other* forms of interpretation of reality and therefore involves certain demands of adherence to given viewpoints. In media discourses on environmental issues, the voice of science is profusely used as a mechanism of accreditation, of authority, as a source of knowledge and as an instrument of control of public opinion. Harré et al. argue that “one of the reasons why the natural sciences serve as a powerful source of rhetorical devices is that they incorporate within their rhetoric the idea of impersonal authority” (Harré et al. 1999, 67). In the discourse of science there is a “rhetoric of evidence” which confers intrinsic proof value to discourse (cf. Delavigne 1994). Representations of science in the media often amplify this image of science as the ultimate source of truth (e.g. Nelkin 1987).

Contrasting with this tendency, uncertainty and contention in scientific knowledge have been salient themes in the United States and, until recently, in some of the British press discourse about climate change, despite the wide scientific consensus that has developed in the last decade (Antilla 2005; Boykoff and Boykoff 2004; Carvalho 2007; Zehr 2000). A complex scientific issue, climate change has been turned by the media into a battlefield of arguments and disputes which have been fed by the so-called climate “sceptics” or “contrarians” who have been very vocal in their claims that climate change is not taking place or that it is not caused by anthropogenic factors<sup>4</sup>. Some highly regarded media norms and news values, such as “balance” and the praise for “conflict” and “controversy”, have contributed to this disproportional visibility of the “sceptics” with important consequences for the public perception of the issue and for the legitimization of inadequate policies. One of the aims of this article is to analyse whether this tendency for enhancing uncertainty and the marginal views of the “sceptics” has occurred in the Portuguese newspapers *Público* and *Correio da Manhã*.

### **The voice of science in media texts on climate change**

The collected corpus is marked by an enunciative heterogeneity that is manifested, amongst other resources, by frequently used citational mechanisms. In fact, citation decisively shapes media discourse on environmental issues. The multiple voices that are convoked appear through diverse modes (direct speech, indirect speech, free indirect speech and diffuse forms of citation). The choice of these reporting mechanisms serve strategic goals such as projecting a specific image of the speaker, reinforcing the power of discourse and the efficacy of social influence.

Several linguists have emphasized, in diverse ways, that citation is inherent to the production of discourse (Fonseca 1992; Moirand 1999; Duarte 2003a), and that in media discourse citation is the rule rather than the discourse fully assumed by the enunciating subject (Paredes 2000; Duarte 2003b). To some scholars, one of the reasons for evoking multiple voices is the permanent “discursive insecurity” of the journalist (e.g. Grunig 1982; Moirand 1999, 2003; Beacco et al. 2002) when faced with problems that are controversial both in terms of scientific knowledge and of potential social repercussions. In these cases, the journalist is normally not able to assess the credibility of conflicting science claims and to explain fully the various dimensions of the issues being debated.

As detailed in the following pages, the recontextualization of science in media discourse presents recurrent marks of internal organization: deletion of agency; excessive emphasis on conclusions and exclusion of premises and non-final aspects of the original discourse; frequent use of numbers and of quantification (not always referring the relative value of such numbers and their effective meaning in the context they were produced in).

While not necessarily formally representative, the segments that will be analysed below were chosen to illustrate aspects of media discourse on climate change and science that we identified as being recurrent in the collected corpus. In some cases, we also found that it was relevant to provide examples of exceptions or minority tendencies in such discourse.

The emergence of the voice of science in the collected corpus is manifested in the attribution of the original enunciating responsibility to various entities. Speech is frequently attributed to “scientists” or “experts”, whether or not they are individualized (see segments (1)-(3)). When they are identified by their name, and given that these individuals are normally not known to the general public, a condensed descriptive segment is added to explain the relevance of listening to a given expert. This segment, associating the individual to a scientific institution, authorizes her/his opinion and justifies the journalist’s choice of that specific enunciator. In some cases, there is also an explicit evaluation by the author (segments (3) and (4)). The relevance, authority or worth of the scientific institutions is not contested, and it is assumed that the evoked voice is representative of that institution.

- (1) **Os cientistas** estão a lançar alertas há anos e, mais recentemente, deram o seu completo aval ao veredicto de culpa para o homem. (Fernandes, *Público*, 30/11/1997).

(1') **Scientists** have been alerting [the world] for years and, more recently, have fully subscribed to the guilty verdict to humanity. (Fernandes, *Público*, 30/11/1997).

(2) Não é essa a opinião dos **peritos** europeus, para quem o esforço a realizar para diminuir nos tais 15 por cento as emissões corresponderia apenas a uns 0,3 por cento do PIB. (Fernandes, *Público*, 03/12/1997)

(2') That is not the opinion of the European **experts**, for whom the effort required for that 15 per cent decrease in emissions would correspond only to some 0.3 per cent of GDP. (Fernandes, *Público*, 03/12/1997)

(3) De acordo com um grupo de médicos e **outros especialistas** de vários países, os efeitos do sobreaquecimento sobre a saúde humana e o meio ambiente poderão ser gravíssimos.

**Eric Chivian, um especialista em saúde ambiental da Universidade de Harvard que lidera uma equipa de peritos internacionais** que se deslocou a Quioto, alertou ontem que os efeitos do aquecimento global poderão ser mortais. ("Proposta norte-americana ganha adeptos em Quioto", *Correio da Manhã*, 03/12/1997)

(3') According to a group of doctors and **other experts** from several countries, the effects of warming on human health and the environment may be extremely grave.

**Eric Chivian, a specialist in environmental health from the University of Harvard who leads a team of international experts** that went to Kyoto, warned yesterday that the effects of global warming can be deadly. ("Proposta norte-americana ganha adeptos em Quioto", *Correio da Manhã*, 03/12/1997)

(4) "Há pouca margem de manobra para duvidar sobre a seriedade do problema [das alterações climáticas] que o mundo enfrenta", escreve **Donald Kennedy, director da prestigiada revista científica "Science"**, na sua edição de hoje. (F., *Público*, 30/03/2001)

(4') "There is little margin to doubt the seriousness of the problem [of climate change] that the world faces", writes **Donald Kennedy, director of the prestigious journal "Science"**, in today's issue. (F., *Público*, 30/03/2001)

Unlike most of the US mainstream media, the Portuguese newspapers that were analysed here tend to award little space to uncertainty and to the climate change "sceptics", promoting an image of solid scientific knowledge and a unified scientific community. The following example shows how the journalist acknowledges the views of one of the "sceptics"

and immediately creates distance in relation to his position and claims. The use of the words “propaganda” and “stage” suggests a disqualification of Singer and his opinions.

(5) Fred Singer, professor de ciências do ambiente na Universidade de Virginia e um **destacado investigador contra-corrente**, foi um dos que decidiu ir a Quioto para **propagandear a sua visão, aproveitando o palco** da conferência mundial. (Reuters e AFP, *Público*, 11/12/1997)

(5') Fred Singer, an environmental sciences professor at the University of Virginia and a **prominent counter-current researcher**, was one of those that decided to go to Kyoto to **make propaganda of his view, taking advantage of the stage** of the world summit. (Reuters and AFP, *Público*, 11/12/1997)

Despite the fact that *Público* and *Correio da Manhã* do not, on a regular basis, exploit the conflict between claims related to climate change science, the texts they carry occasionally manifest such tensions. For example, the following segment, from an opinion piece, reveals some of the aspects of the discursive battle regarding environment-relevant knowledge, such as labelling others and controversy in relation to legitimate speakers.

(6) Estes valores contrastam fortemente com um estudo elaborado pelo MIT (e esta Universidade não pode ser propriamente considerada uma das seitas de “hippies/ecologistas”, como a “gente séria do nuclear” costuma classificar os que se lhes opõem). (Fernandes, *Público*, 22/02/2006)

(6') These values contrast sharply with a study done at the MIT (and **this University cannot exactly be considered one of the sects of “hippies/ecologists”, like the “serious pro-nuclear people” usually classify those that oppose them**). (Fernandes, *Público*, 22/02/2006)

Frequently, there is a metonymical reference in the identification of the voice of scientists: as illustrated by excerpts (7) and (8), in the place of a specific researcher's name or of the leaders and other elements of a research team, there is a mention to a “report”, a “study”, to “models”, and to “research”.

(7) **Os modelos climáticos** criados pelos cientistas do IPCC prevêem um aumento da temperatura entre 1,5 graus centígrados até 5 graus no ano 2100. Este aumento “é acompanhado por alterações nos padrões climáticos



regionais e temporais e na intensidade da chuva, aumentando a tendência para inundações e secas”, diz **o relatório**. (*Público*, 30/11/1997).

(7') **Climate models** created by the IPCC scientists forecast a temperature rise of 1.5 to 5 degrees centigrade by the year 2100. This rise “is accompanied by changes in the regional and temporal climate patterns and in the intensity of rain, increasing the tendency for floods and droughts”, says **the report**. (*Público*, 30/11/1997)

(8) **Estudos** revelam que, previsivelmente, vão registar-se fenómenos extremos com o acentuado aumento da temperatura ambiente que “pode prevalecer por períodos mais longos de tempo e acima dos 38 graus centígrados, a par de uma importante redução dos recursos hídricos”. **Prevêem-se** reduções na precipitação que podem atingir os 40%, até 2050. (Dias, *Público*, 20/02/2006)

(8') **Studies** reveal that, predictably, extreme phenomena will occur together with the sharp temperature rise that may “last for longer periods of time and be above 38 degrees centigrade, together with a significant reduction of water resources”. Reductions in precipitation that may be up to 40% until 2050 **are predicted**. (Dias, *Público*, 20/02/2006)

These excerpts illustrate that one of the criticisms that have been directed towards scientific discourse appears to have migrated to media discourse on environmental matters: deleting agency and the responsibility of each individual and awarding visibility to results that are “orphan” of their human producers<sup>5</sup>. This strategy concurs to the creation of a “rhetoric of evidence” that presents scientific claims as spontaneous outcomes of empirical reality, independent of the researcher’s work and her/his interpretation. Obviously, it is more difficult to challenge assertions that are presented as mirroring irrefutable facts than opinions or viewpoints assumed by an individual.

The following article constitutes an interesting exception to the tendency that the media have to black-box the process of the construction of science. By pointing out the complex and uncertain factors that are present in scientific models of the kind used in climate change studies, the article presents science as something that is constructed (not revealed) and subject to change (not eternally valid).

(9) Até onde vai subir a temperatura do planeta?  
Clara Barata

O mundo está a aquecer, e a actividade humana está por trás do aumento da temperatura do planeta. **Nisso, os cientistas já concordam**. Mas até que

ponto vai a Terra continuar a aquecer nos próximos séculos? Aí, **a resposta é muito mais incerta**: tudo depende da sensibilidade do sistema climático, formado pela interação dos oceanos, dos gelos, dos solos, da vida. (...) O problema é que a sensibilidade do clima não se pode medir directamente. **Tem de ser calculada através de complexos modelos matemáticos, construídos pelos investigadores, para calcular a forma como o clima evolui se forem ajustados diferentes parâmetros (...).** A maioria dos modelos avança um aumento da temperatura global durante o próximo século entre 1,5 e 4,5 graus Celsius. O limite mínimo **parece estar a fixar-se**: é pouco provável que a temperatura da Terra não suba pelo menos 1,5 graus Celsius. **Mas há ainda muitas incertezas** quanto ao valor máximo, embora **os cientistas tentem calibrar os seus modelos informáticos** com informações obtidas pelos paleontólogos e geólogos, **analisando rochas e amostras de gelo para conhecer as concentrações de gases na atmosfera de tempos passados.** (Barata, *Público*, 28/02/2006)

(9') How high will the planet's temperature rise?

Clara Barata

The world is heating up and human activity is behind the planet's temperature rise. **Scientists already agree on that.** But to what extent will the Earth continue to heat up in the next centuries? There, **the answer is more uncertain**: it all depends on the sensitivity of the climatic system, formed by the interaction of oceans, ices, soils, and life. (...) The problem is that the sensitivity of the climate cannot be measured directly. **It has to be calculated through complex mathematical models, built by researchers, to calculate the way the climate evolves if different parameters are adjusted (...)** Most of the models indicate a global temperature rise during the next century of 1.5 to 3.5 degrees centigrade. The minimum limit **appears to be getting fixed**: it is not very likely that the Earth's temperature rise will be below 1.5 degrees centigrade. **But there are still many uncertainties** regarding the maximum value, **although scientists try to calibrate their computer models** with information gathered by paleontologists and geologists, **by analysing rocks and ice samples in order to know the concentration of greenhouse gases in the past.** (Barata, *Público*, 28/02/2006)

As it refers to uncertainties in science, to progressions in the construction of knowledge, and to the tools of scientific knowledge and their potential limitations, excerpt (9) sheds light on science as a process and a construct rather than a universal truth that is “out there” and just needs to be grasped. Crucially, it must be noted that this representation of uncertainty is very different from the one that can be found in many of the US media as it does not support a discourse of discreditation of climate change

science and scientists. Further down, excerpt (14) also exemplifies a similar reference to uncertainty.

Excerpt (10) shows that, in some (rare) cases, scientific doubts are also exposed in the Portuguese media discourse, showing the transitional and fallible character of some knowledge claims:

(10) Por causa de aumento da temperatura do planeta, a quantidade de gelo derretido que os glaciares da Gronelândia estão a deitar para o Atlântico quase duplicou nos últimos cinco anos, dizem hoje na revista Science investigadores dos Estados Unidos. Por isso, **os modelos** usados para calcular a contribuição dos glaciares desta ilha gelada para a subida do nível dos mares **podem estar errados**, dizem. (Barata, *Público*, 17/02/2006)

(10') Due to the planet's temperature rise, the amount of melted ice that the Greenland glaciers are throwing into the Atlantic has nearly doubled in the last five years, say researchers from the United States in today's Science journal. Therefore, they say that **the models** used to calculate the contribution of this frozen island's glaciers to sea level rise **may be wrong**. (Barata, *Público*, 17/02/2006)

In contrast with the tendency for media discourse to present science and policy-making as two separate realms, the science-policy nexus became manifest in the press coverage of the debate on nuclear power and its contribution to mitigate greenhouse gas emissions. The distinction between the roles of scientist/expert and advocate/interested party is blurred in the following excerpt from *Público* as academics appear in defence of particular political/economic actions.

(11) Também o académico João Peças Lopes **se mostrou contra a opção nuclear**, afirmando [...] não ser 'interessante em Portugal num futuro próximo, atendendo ao volume de energia que irá alimentar e às características do sistema eléctrico português'. José Delgado Domingos, **histórico opositor do nuclear** e professor do Instituto Superior Técnico, **contrapôs a aposta nas renováveis**, nomeadamente eólica, e no aumento da eficiência energética. (...) **A perspectiva de que o nuclear 'não é uma religião, mas um negócio'** foi levada a debate pelo professor do instituto norte-americano MIT, Paul Joskow (...) Pedro Sampaio Nunes [apresentado antes como 'ex-secretário de Estado da Ciência' que tem 'promovido, nos últimos meses, a construção de uma central nuclear'] **defendeu a energia nuclear enquanto factor do aumento da competitividade da indústria portuguesa, não-poluente e segura**. O carvão oferece 'maior perigosidade' e em termos de acidentes 'a hídrica é a

forma mais letal’ de gerar electricidade, segundo afirmou. (Ferreira, *Público*, 23/02/2006)

(11’) The academic João Peças Lopes **also stood against the nuclear option** by saying that it would not be ‘interesting in Portugal in a near future, given the volume of energy it will feed and the characteristics of the Portuguese electricity system’. José Delgado Domingos, a **historical opponent of nuclear power** and professor at the Instituto Superior Técnico, countered the nuclear power option with a bet in renewable energies, namely wind power, and in the improvement of energy efficiency. (...) The view that nuclear power is ‘not a religion, but a business’ was introduced by Paul Joskow, professor at the North-American MIT (...) Pedro Sampaio Nunes [previously introduced as the ‘ex-Secretary of State for Science’ that has ‘promoted the construction of a nuclear power station in the last few months’] **defended nuclear power as a factor for increasing the competitiveness of the Portuguese industry, in a non-polluting and safe way**. Coal offers ‘higher levels of danger’ and, in terms of accidents, ‘hydraulic power is the most lethal’ option for generating electricity, according to him. (Ferreira, *Público*, 23/02/2006)

As referred above, the traits of interdiscursivity between scientific and media discourses are identifiable at the local (or micro-textual) level and at the global (or macro-textual) level.

a) At the local level, the most evident marks are morpho-lexical: the vocabulary of science emerges in media discourse very prominently. Let us look at the following example:

(12) Até que, em 1993, no relatório do Painel Intergovernamental para as Alterações Climáticas (IPCC), um organismo criado em 1988 pela Organização Meteorológica Mundial e pelo Programa das Nações Unidas para o Ambiente, a denúncia é clara: ‘As actividades humanas estão a causar aumentos das **concentrações atmosféricas de gases de estufa**, particularmente **dióxido de carbono e metano**, e de **aerossóis (partículas microscópicas)** transportadas pelo ar). Os **gases de estufa** aquecem a atmosfera enquanto os **aerossóis** tendem a arrefecê-lo’. (Fernandes, *Público*, 30/11/1997)

(12’) In 1993, in the report of the Intergovernmental Panel on Climate Change (IPCC), an institution created in 1988 by the World Meteorological Organization and the United Nations Environment Program, there is a clear denunciation: ‘Human activities are generating increases in the **atmospheric concentrations of greenhouse gases**, particularly **carbon dioxide and methane**, and of **aerosols (microscopic particles)** transported by the air). **Greenhouse gases** heat up the

atmosphere while **aerosols** tend to cool it'. (Fernandes, *Público*, 30/11/1997)

In the popular newspaper *Correio da Manhã*, the language of technoscience is filtered at times through a “common sense” lens as when the heading in the excerpt below simplifies the explanation provided by the expert, transforming it into everyday language.

(13) **Qualquer um pode ir ao mercado**

Para o director do Centro de Estudos em Economia de Energia, Transportes e Ambiente, Álvaro Martins, é sinal de que o mercado de licenças de CO<sub>2</sub> está ‘maduro’. ‘**Qualquer um de nós pode ir ao mercado comprar licenças**’, explica o mesmo especialista, adiantando que, por ora, o negócio parece limitado aos operadores industriais. (Ramos, *Correio da Manhã*, 16/02/2006).

(13') **Anyone can go to the market**

For the director of the Research Center on Energy, Transports and Environmental Economics, Álvaro Martins, this is a sign that the market of CO<sub>2</sub> licences is ‘ripe’. ‘**Any of us can go the market to buy licenses**’, explains this expert, pointing out that, for now, the deal appears to be limited to industrial operators. (Ramos, *Correio da Manhã*, 16/02/2006)

At the syntactic-semantic level, the most important indicator is probably the tendency to use nominalizations, the use of impersonal sentence structures and indefinite pronouns and the suppression of the agent, with the rhetoric-pragmatic effects that have been mentioned above, namely the authorization of a statement by a ‘rhetoric of evidence’:

(14) **A redução das incertezas** nos modelos climáticos durará ainda mais de uma década. **As incertezas** sobre os efeitos das nuvens, do vapor de água, do gelo, das correntes oceânicas e de determinadas regiões do globo para o efeito de estufa são ainda enormes. (‘O que já sabemos e o que só imaginamos’, *Público*, 30/11/1997)

(14') The **reduction of uncertainties** in the climate models will still take more than one decade. **Uncertainties** in relation to cloud effects, water vapour, ice, ocean currents and of some of the regions of the planet for the greenhouse effect are still enormous. (‘O que já sabemos e o que só imaginamos’, *Público*, 30/11/1997)

(15) O papel do oceano como ‘absorvente’ de CO<sub>2</sub> **foi recentemente descoberto** e os cientistas consideram que este consegue reter cerca de 30 por cento das emissões, enquanto a biosfera terrestre se deve ficar pelos 25 por cento — **foi observado** que na Primavera, por exemplo, as

concentrações de dióxido de carbono diminuem, pois as plantas aumentam a sua actividade nesta estação. ('O que já sabemos e o que só imaginamos', *Público*, 30/11/1997)

(15') The role of the ocean as a 'sink' of CO<sub>2</sub> **was recently discovered** and scientists consider that it can retain around 30 per cent of emissions, while the land-based biosphere only retains around 25 per cent—**it was observed** that in the spring, for instance, the concentrations of carbon dioxide decrease, because plants increase their activity in this season. ('O que já sabemos e o que só imaginamos', *Público*, 30/11/1997)

(16) **O receio é que** seja o menor denominador comum. (...)

Mas **poucos** têm esperança que esta sugestão seja aprovada e, mesmo antes da Cimeira de Quioto se iniciar, membros da União Europeia já falavam em negociar até aos 10 por cento para o ano 2010. ('As posições dos diferentes países', *Público*, 03/12/1997)

(16') **The fear is that** it will be the common minimum denominator. (...)

But **few** have hope that this suggestion will be approved and, even before the start of the Kyoto Summit, some members of the European Union already spoke about negotiating up to 10 per cent for the year 2010. ('As posições dos diferentes países', *Público*, 03/12/1997)

(17) **As críticas dizem** que esta não passa de uma forma de criar outra bolsa de 'ar tropical'. (F., *Público*, 10/12/1997)

(17') **Criticisms say** [sic] that this is no more than a way to create another 'hot air balloon'. (F., *Público*, 10/12/1997)

Segment (15), as well as the following one, illustrates another common discursive option in the collected corpus: the usage of exact quantifications, similarly to scientific discourse. In some cases, these options transform approximate and/or qualitative values into precise ones. Still, not all qualitative judgements are quantified, such as in example (15) when the journalist writes that "...concentrations of carbon dioxide decrease."

(18) Durante o século XX, o nível médio do mar aumentou entre 0,1 e 0,2 metros.

A precipitação aumentou entre 0,5 e 1 por cento por década no último século, nas latitudes médias e altas do hemisfério norte e entre 0,2 e 0,3 por cento por década nos trópicos. No final do século XX, nas latitudes médias e altas do hemisfério norte, houve um aumento de dois a quatro por cento da frequência de grandes chuvadas. (...)

Hoje, um terço da população mundial (1700 milhões) vive em países que sofrem 'stress' hídrico. (Fernandes, *Público*, 30/03/2001)

(18') During the 20th century, the average sea level rose between 0.1 and 0.2 meters.

Precipitation increased between 0.5 and 1 per cent per decade in the last century in the medium and high latitudes of the northern hemisphere and between 0.2 and 0.3 per cent per decade in the tropics. At the end of the 20th century, in the medium and high latitudes of the northern hemisphere, there was a two to four per cent increase in the frequency of strong rain.

(...)

Today, a third of the world population (1700 million) lives in countries that suffer from hydrological 'stress'. (Fernandes, *Público*, 30/03/2001)

The presentation of factual information and quantifications reinforces the referential dimension of language, which privileges the manifestation of the real, the presentation of the existent and the anticipation of the future sustained on authorized voices (the intertext is a "report" of the Intergovernmental Panel for Climate Change and disseminates what "the scientists" predict, with quantitative details and other scientific resources).

The syntactic organization which emphasizes results at the cost of agents and processes, associated to the inversion of the cause-effect sequence—presenting, instead, an effect-cause sequential organization—can be illustrated by the following excerpt:

(19) Os gases que provocam o efeito de estufa estão a aumentar devido às actividades humanas. (...)

A estratosfera continuará a arrefecer de uma forma significativa ao mesmo tempo que a concentração de dióxido de carbono aumenta.

A quantidade de vapor de água na troposfera (0 a 3Km de altitude) aumentará exponencialmente com a mudança da temperatura média (seis por cento mais vapor de água, por cada 1°C de aumento da temperatura). ('O que já sabemos e o que só imaginamos', *Público*, 30/11/1997)

(19') The gases that cause the greenhouse effect are increasing due to human activity. (...)

The stratosphere will continue to cool in a significant way at the same time as the concentration of carbon dioxide increases.

The amount of water vapour in the troposphere (0 to 3 km altitude) will increase exponentially with the change of the average temperature (six per cent more water vapour, for every 1°C rise in temperature). ('O que já sabemos e o que só imaginamos', *Público*, 30/11/1997)

Other syntactic-semantic structures mark the recontextualization of scientific and technical discourse. There is, for instance, a recurrent employment of reformulation markers, such as “isto é”, “ou seja” (“that is”) and “quer dizer” (“in other words”):

(20) Por outro lado, querem criar uma **‘bolsa de emissões’**, **isto é**, que seja possível ‘comprar’ a outros países que pouco emitem a possibilidade de, na prática, poderem poluir por eles. (‘As posições dos diferentes países’, *Público*, 03/12/1997)

(20’) On the other hand, they want to create an **‘emissions trading system’**, **that is**, the possibility of ‘buying’ the allowance from other countries that emit little to, in practice, be able to pollute in their place. (‘As posições dos diferentes países’, *Público*, 03/12/1997)

(21) No entanto, o problema do metano não é tão grave como o do dióxido de carbono, já que o seu ciclo de vida é de apenas 15 anos enquanto que o do CO<sub>2</sub> é de séculos. O que **quer dizer** que qualquer redução das suas emissões irá permitir uma rápida diminuição deste gás na atmosfera. (Fernandes, *Público*, 30/11/1997)

(21’) Nevertheless, the problem of methane is not as grave as carbon dioxide, given that its lifecycle is just 15 years while that of CO<sub>2</sub> is centuries. **In other words**, any reduction in its emissions will allow for a rapid decrease of this gas in the atmosphere. (Fernandes, *Público*, 30/11/1997)

This reiterated use of reformulations illustrates a meta-linguistic judgement by the speaker, which reveals her/his recognition of the technical character of the reformulated lexeme or expression. In some cases, the term is marked by inverted commas, suggesting the presence of another enunciator and the role of the speaker as mediator between the former and the addressee; in other cases, the technical term is incorporated in the speaker’s discourse, but the relative distancing from standard language is equally recognized. There is, thus, both the reformulation of the discourse of another enunciator, as well as of the discourse of the speaker him-/herself. However, in many cases, there appears to be an appropriation of technical vocabulary and of syntactic structures typical of the scientific discourse by the speaker. The reformulation mechanism is therefore both a product of the heterogeneity of discourse and constitutive thereof.

In all cases, the speaker assumes that the two terms of the paraphrase are equivalent and identical. This equivalence/identity should not be understood as *a priori* and permanent. Instead, it has a dynamic character,



resulting from the specific enunciating situation. The meaning of each sequence is not given to the speaker; it is the product of her/his reconstruction and involves the suppression, or non-consideration, of semantic differences thought to be irrelevant or marginal. As argued by Fuchs (1982), the inevitable distance between the two sequences is elided in functional terms<sup>6</sup>.

**b)** Above we have shown some micro-textual traits of interdiscursivity between scientific and media discourses. However, as previously mentioned, it is also possible to identify aspects of interdiscursivity at the global (macro-textual) level. The adhesion of the journalistic text to the organizational structure of the scientific text can be illustrated by excerpts (22) and (23).

Segment (22) is from a text organized into multiple internal titles that identify “the problem”, “the effects”, “the forecasts” and “the future consequences”. Other subordinated titles introduce more topics: “hydrology”, “agriculture”, “land-based ecosystems”, etc. Each brief paragraph presents a concept in a synthetic, dictionary-like fashion. This organization is close to the model of the scientific “popularization” text. It performs a set of acts of denomination, explaining the motivation of the designations. But it also has marks of the scientific discourse *inter pares* (objectified enunciation, technical vocabulary, intensive use of quantifications and percentages). Clearly, it promotes citizens’ familiarity with environmental sciences issues by having a sequential organization and progressive order, by explaining each topic with analytical objectivity and by adopting a clear and well-defined structure.

**(22) O que os cientistas prevêem**

(...)

**O problema**

(...)

**Os efeitos**

(...)

**As previsões**

(...)

**As consequências futuras**

**Hidrologia**

(...)

**Agricultura**

(...)

**Ecossistemas terrestres**

(...)

**Ecosistemas marinhos**

(…)

**Saúde**

(…)

**Aglomerados humanos**

(…)

**Os custos económicos** (Fernandes, *Público*, 30/03/2001)**(22') What the scientists forecast**

(…)

**The problem**

(…)

**The effects**

(…)

**The forecasts**

(…)

**The future consequences****Hydrology**

(…)

**Agriculture**

(…)

**Land-based ecosystems**

(…)

**Marine ecosystems**

(…)

**Health**

(…)

**Human settlements**

(…)

**Economic costs** (Fernandes, *Público*, 30/03/2001)

Excerpt (23) is from a text which is an adaptation of a scientific article published in the journal *Science*:

**(23) O que já sabemos e o que só imaginamos**

As actividades humanas (…)

**Factos**

- Os gases que provocam o efeito de estufa (…)

***Projeções quase certas (mais de 99 por cento de certeza)***

- A estratosfera continuará a arrefecer (…)

***Projeções muito prováveis (mais de 90 por cento de certeza)***

- O aquecimento global observado no último século (…)

***Projeções prováveis (mais de 66 por cento de certeza)***

- Os modelos apontam para (...)

***Projeções incorrectas***

- Não há qualquer certeza (...) (“O que já sabemos e o que só imaginamos”, *Público*, 30/11/1997)

**(23’) What we already know and what we only imagine**

Human activities (...)

**Facts**

- Gases that cause the greenhouse effect (...)

***Almost certain projections (more than 99 per cent certainty)***

- The stratosphere will continue to cool (...)

***Very probable projections (more than 90 per cent certainty)***

- Global warming observed in the last century (...)

***Probable projections (more than 66 per cent)***

- Models point to (...)

***Incorrect projections***

- There is no certainty (...) (“O que já sabemos e o que só imaginamos”, *Público*, 30/11/1997)

This text presents marks of the original discourse (and, more generally, of the discourse of science). It has a sequential composition comprising an introduction and five other parts—“facts”, “almost certain projections”, “very probable projections”, “probable projections” and “incorrect projections”. The original article by J. D. Mahlman (1997) displays a similar structure: after an introduction, there are five parts entitled “virtually certain ‘facts’”, “virtually certain projections”, “very probable projections”, “probable projections” and “incorrect projections and policy implications”.

In both texts, after an introduction with a typical sequential organization, the various parts consist of a list of short topics, which, in the second text, are a full or partial reproduction of the first one. Actually, the journalistic article is nearly a translation of the original article, with various suppressions. The usage of percentages to create degrees of probability evokes the IPCC’s reports.

However, other forms of organizational structure are also found. The following excerpt mirrors the language and structure of internet websites,

approximating the discourse of “scientists” and “experts” to lay people’s lifeworld discourses. Excerpt (24) illustrates an expected difference between the “quality” newspaper *Público* and the “popular” newspaper *Correio da Manhã*, where it was found. In the latter, the language and organization of techno-science is more often reformulated in terms that are more familiar to the reader than in *Público*.

**(24) Perguntas Mais Frequentes**

Qual a situação de Portugal entre os países da UE?

Portugal é país da União Europeia a 15 que deverá ficar mais longe das metas de Quioto para a redução das emissões de gases poluentes, prevenindo-se um aumento de 42,2 por cento entre 2008-2012.

(...)

Que gases contribuem para o efeito de estufa?

São seis os gases com efeito estufa (GEE)—sendo o mais importante o dióxido de carbono—que contribuem para as alterações climáticas, cujos efeitos já se começam a sentir através das secas, cheias, incêndios e ondas calor, cada vez mais frequentes. (Ramos, *Correio da Manhã*, 16/02/2006)

**(24') Frequently Asked Questions**

What is the situation of Portugal within the EU?

Portugal is the European Union (EU-15) member that will most likely remain further away from the Kyoto targets for reducing emissions of polluting gases; a rise of 42.2 per cent for the period 2008-2012 is predicted.

(...)

Which gases contribute to the greenhouse effect?

There are six greenhouse gases—the most important one being carbon dioxide—which contribute to climate change, whose effects are already being felt with increasingly frequent droughts, floods, wildfires and heatwaves. (Ramos, *Correio da Manhã*, 16/02/2006)

## Concluding remarks

This article has briefly analysed some aspects of the interdiscursive dialogue between media discourse on climate change and the discourse of science. Such a dialogue is manifested in the internal organization and in the discursive/communicational process of the former.

Although media discourse on environmental issues encompasses other dimensions, such as political and economic ones, it uses science as a foundational and legitimacy discourse. By evoking voices from the science community, the journalist can both project an image of neutrality and legitimise her/his discourse. This is instrumental for the success of

her/his illocutionary goals, for the acceptance of her/his speech and even for the public sanctioning of a given discourse on the environment.

The Portuguese media that we have analysed tend to present science as an authoritative source of reliable knowledge which appears to be self-evident and decanted of human input. There are a few instances where the social and political contexts of the production and circulation of scientific discourses become manifest in the press, and some of the contingencies, interests and doubts are revealed. This is especially the case in the last period that was analysed (February 2006), which may signal an interesting evolution in media discourse; however, in the whole, this remains a minority tendency.

It is possible to detect some differences between the “quality” and the “popular” newspapers that were analysed, although not as significant as could be expected. Firstly, *Correio da Manhã* published much fewer articles on climate change that referred to science than *Público*. Secondly, the former newspaper displayed macro- and micro-textual characteristics that appear to indicate a concern with the simplification of the language and structure of scientific discourse for its audience.

While possibly strengthening the social prestige of science, the typical discursive construction creates a distance between scientists and citizens, between the world of knowledge and the world of experience, which can be disempowering. In face of a discourse where scientists are constructed as the guardians of the truth, citizens may feel as incapable agents. Critically, the media may thus contribute to the development of citizen expectations about the possibility of scientific and technological solutions to climate change and other environmental issues. Interestingly, however, the discourse that we have analysed is at some points marked by didacticism: in other words, it aims to increase the competence of the addressees, giving them access to the products of scientific research and to the discourse of science on given topics with repercussions on social life.

## Notes

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<sup>2</sup> Some aspects of this article are more extensively analysed in Ramos 2005.

<sup>3</sup> Genthilhomme (1984) refers, more radically, to the “monosemic character” of scientific discourse, and Cassany and Martí argue that science uses “univocal terms” (2000, 2666), as opposed to the less technical register of the common citizen.

<sup>4</sup> Gelbspan (1997) and others have pointed out connections between this small group of individuals and the fossil fuel industries.

<sup>5</sup> On the use of passive structures in the description of the state of things, see Kahn (2001), who, in examining “biologists dialect”, views this resource as a strategy to absolve oneself of responsibility.

<sup>6</sup> Fuchs states: “interpréter X et Y, c’est leur assigner à chacun un sémantisme unique et particulier, en faisant comme si ce sémantisme était tout à la fois celui que voulait produire l’émetteur, celui qui serait inhérent aux séquences, et celui que décode le récepteur: c’est ramener la multiplicité et la multivocité possibles à l’unicité et à l’univocité” (Fuchs 1982, 126).

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